Continuing Education

American Heart Association Guidelines 2010

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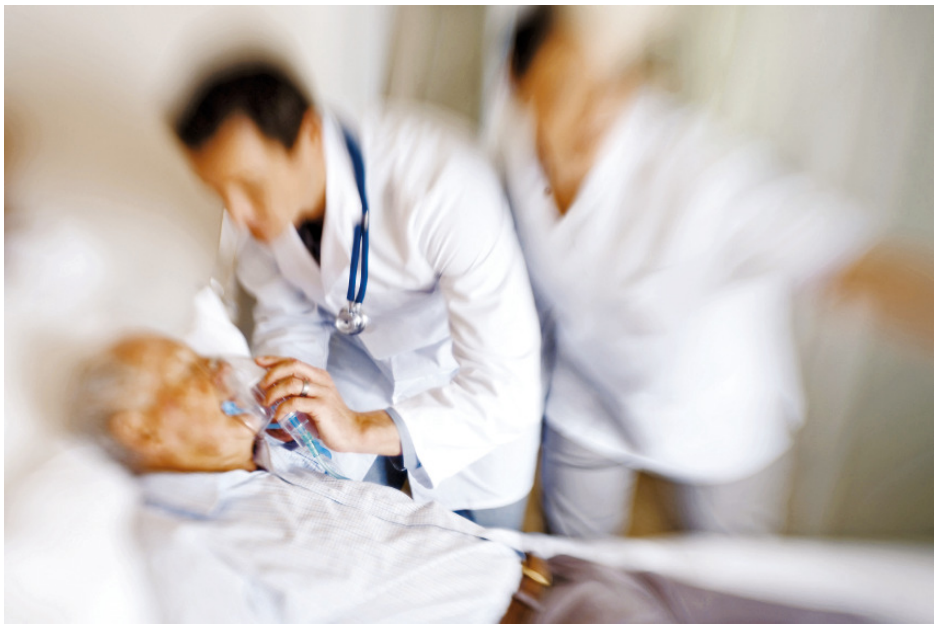

This narrative addresses the impact of the American Heart Association (AHA) Guidelines 2010 (G2010) on EMS personnel. It does not address the impact on lay rescuers. This summary represents the author's interpretation of the implications of G2010.

Basic cardiac life support

Dispatcher identification of cardiac arrest

2005: Guidelines 2005 (G2005) made a Class IIb recommendation for emergency dispatchers to develop a strategy for helping callers differentiate between normal breathing and agonal gasping. G2005 made no recommendations for linking seizure-like activity to cardiac arrest.

2010: Guidelines 2010 (G2010) addresses the seizure-like movements and makes much stronger recommendations regarding the presence of gasping. G2010 makes a Class I recommendation for specific dispatch training to improve telephone recognition of cardiac arrest. This training should include recognition of abnormal breathing patterns and an awareness of the potential implications of seizure-like activity in unresponsive victims.

Why Change? Patients suffering from sudden cardiac death often display muscle movement that resembles a seizure. In addition, some patients will have occasional gasps that give the appearance of active breathing. Both of these signs can confuse

AHA Classes of Recommendation

Any discussion about the recent AHA guideline change requires a brief introduction to the Classes of Recommendation. The highest level is a Class I recommendation, which means that the benefit of the intervention substantially outweighs the risk of harm. EMS personnel should always perform Class I interventions when indicated.

Class IIa interventions are supported by evidence, are reasonable and are generally useful. Class IIb recommendations are reserved for much weaker evidence that demonstrates only short-term advantages or mixed results. EMS personnel may consider performing or administering Class IIb interventions, as they may be useful, although the usefulness is not well established.

The 2005 guidelines had an Indeterminate level of recommendation that meant there was insufficient evidence to support the intervention, but no evidence of harm. The 2010 guidelines eliminated this level of recommendation. When the guideline authors felt there was insufficient evidence to recommend for or against an intervention, they simply offer no recommendation at all.

Finally, the worst is a Class III recommendation. For this level, the evidence demonstrates that the risk of harm outweighs any potential benefit. EMS providers should generally avoid performing Class III interventions.

rescuers, thereby delaying both the recognition of true cardiac arrest and the initiation of CPR.

Accumulating evidence demonstrates improved outcomes with earlier initiation of CPR. An initial delay in providing chest compression contributes to morbidity and mortality for a victim of cardiac arrest. With more straightforward questioning, dispatchers may help callers identify the presence of cardiac arrest much earlier and thereby provide CPR instructions earlier in the call.

Dispatchers should provide CPR instructions

2005: In 2005, the American Heart Association made two important recommendations concerning dispatchers providing CPR instructions. First, the AHA made a Class IIa recommendation for dispatchers to receive training in providing prearrival CPR instructions to callers. Next, the AHA made a Class IIa recommendation that dispatchers provide compression-only CPR instructions when bystanders were unable or unwilling to incorporate ventilation into a conventional CPR strategy.

2010: For 2010, the AHA upgraded both previous recommendations to Class I status. Emergency response systems should ensure that dispatchers be appropriately trained in providing prearrival CPR instructions. Because providing conventional CPR instructions over the phone is complicated, dispatchers should provide compression-only instructions to untrained callers.

Why Change? Most adult victims of sudden cardiac death do not receive any CPR before the arrival of emergency medical personnel. Compared to no CPR, outcomes improve when someone on the scene provides CPR. Even though the best outcomes occur when CPR includes both compression and ventilation, a bystander performing compression-only CPR is better than no CPR at all. However, when information from the caller suggests an asphyxial origin, dispatchers should include ventilation in the sequence of telephone CPR instructions.

Cricoid pressure

2005: In 2005, the AHA recommended that one rescuer apply cricoid pressure during assisted ventilation, although G2005 did not assign a specific class rating to the recommendation.

2010: While acknowledging that the technique might have some value in promoting glottic visualization during endotracheal intubation, the newest AHA guidelines do not recommend the routine use of cricoid pressure during cardiac arrest, thereby making it a Class III recommendation.

Why Change? Even with proper technique, cricoid pressure does not prevent aspiration and often interferes with advanced airway placement. Following a training program, neither lay nor professional rescuers could demonstrate proficiency with the technique. Therefore, in the absence of proven benefit and known harm, it is not reasonable for rescuers to continue performing the procedure.

Hands-only CPR

2005: In 2005, the major steps in the CPR training sequence for both lay rescuers and for health care providers were the same. Both included ventilation and compression. However, for simplicity, G2005 made a Class IIa recommendation for dispatchers to provide compression-only instructions to callers with no previous CPR training. In addition, the AHA made a Class IIa recommendation that lay rescuers who were unwilling to provide ventilation should perform compression-only CPR.

2010: G2010 makes no substantial changes to the G2005 emphasis on chest compressions. However, the AHA now calls compression-only CPR by a new name: hands-only CPR. The AHA introduced this term in 2008. The AHA makes a Class I recommendation for dispatchers to provide hands-only CPR instructions to callers with no previous CPR training and to lay rescuers who are unwilling to provide ventilation. As a Class I recommendation, health care providers should continue to provide high-quality CPR that includes both compression and ventilation. If unable to provide effective ventilation, the health care provider should provide hands-only CPR.

Why Change? Hands-only CPR involves fewer steps and is a less complicated set of instructions for dispatchers to convey over the telephone to untrained callers. Health care providers, on the other hand, are trained and therefore should continue to utilize a sequence of CPR steps that includes both compression and ventilation.

Activation of emergency response system

2005: G2005 recommended that health care providers begin the CPR sequence by first assessing the responsiveness of the patient. After confirming unresponsiveness, the health care provider activated the emergency response system, followed by an airway and breathing assessment.

2010: G2010 directs health care providers to simultaneously establish unresponsiveness while assessing the breathing status of the patient. Multiple studies demonstrate the difficulty that both lay rescuers and health care providers have in accurately detecting a pulse. G2010 makes a Class IIa recommendation for health care providers to take no longer than 10 seconds to perform these assessments. As a Class I recommendation, the AHA instructs health care providers to suspect cardiac arrest and activate the emergency response system if the victim is not breathing, is taking agonal breaths or is gasping.

Why Change? This change should not result in a delay in activation of the emergency response system. The change merely directs the health care provider to make two assessments at the same time—verifying unresponsiveness and checking for the presence of normal breathing.

Change in CPR sequence, including removal of "look, listen and feel"

2005: Previous guidelines advocated an ABC-

approach to assessment and interventions, directing rescuers to open the airway and check for normal breathing. This assessment involved three inter-related steps, popularized by the expression "look, listen and feel for breathing," which had no specific class recommendation.

2010: G2010 advocates a new approach to assessment and management. The new CPR sequence follows a CAB-approach, with the rescuer first determining unresponsiveness while simultaneously looking for normal breathing. The American Heart Association removed "look, listen and feel" from the initial assessment steps of CPR. Instead, the health care provider will perform a short pulse check after determining unresponsiveness and begin CPR with chest compressions, a Class IIb recommendation. After delivering an initial set of 30 chest compressions, health care providers should open the airway and deliver two breaths.

Why change? Beginning the CPR sequence with ventilation requires health care providers to open the patient's airway; look, listen and feel; retrieve a bag-mask device; and effectively seal a mask before delivering breaths. These actions take time, which delays delivery of the first chest compression. On the other hand, starting with chest compressions restores some degree of forward blood flow almost immediately.

No animal or human studies demonstrate improved outcome when rescuers begin the CPR sequence with chest compressions. However, delivery of chest compressions clearly offers survival advantages over no chest compressions. Animal studies suggest that delays or interruptions in chest compressions reduce survival. Beginning the sequence with chest compressions should delay ventilation by about 18 seconds and will alternatively allow the rescuer to initiate compressions sooner. This ventilation delay may be even shorter when two rescuers are present on the scene.

Following the delivery of 30 chest compressions, G2010 makes two Class IIa recommendations about the breaths. First, health care providers should deliver each of the two rescue breaths over a one-second period. The second recommendation is for health care providers to issue enough tidal volume to produce visible chest rise.

Chest compression rate

2005: G2005 made a Class IIa recommendation that rescuers perform chest compressions at a rate of about 100 per minute.

2010: Without changing the class recommendation, G2010 makes a minor wording change for the chest compression rate. Health care providers should now deliver *at least* 100 chest compressions per minute.

Why Change? Survival with good neurological outcome following cardiac arrest is, in no small part, due to the quality of chest compressions provided during the resuscitation attempt. One important component of high-quality CPR is the number of chest compressions delivered each minute, which is related but not equal to the rate of chest compressions. Rate refers to the cadence of the performed chest compressions. The number and duration of interruptions influence the actual number of compressions delivered each minute. Describing chest compression rate using terms such as about 100 per minute implies that slower rates are acceptable. However, rates slower than 100 per minute, when offset by the cyclic interruptions for ventilation could result in delivery of an inadequate total number of chest compressions. G2010 strengthens the emphasis on high-quality CPR by recommending a minimum compression rate of at least 100 per minute instead of about 100 per minute.

Chest compression depth

2005: Without making a specific class recommendation, G2005 advised rescuers to depress the sternum to a depth of approximately one-and-a-half to two inches when performing chest compressions.

2010: G2010 recommends that rescuers depress the adult sternum to a depth of *at least* two inches, a Class IIa recommendation.

Why Change? On the surface, the change appears subtle. Use of the word *approximately* provides a degree of ambiguity and confusion as to the proper depth. Recommending a depth of *at least* two inches more accurately emphasizes the criteria necessary for effective compressions. Deep chest compressions promote forward blood flow, deliver oxygen to the vital organs and improve the chances of a good outcome. Data suggests that a compression depth of two inches provides better forward blood flow than does compressions of one-and-a-half inches.

Electrode placement

2005: G2005 recommended three acceptable AED pad configurations. Each received a Class IIa recommendation and each required placement on the patient's bare chest. The first and most-often used position is called the sternal-apical position, and it involved placing the sternal pad just under the patient's right clavicle with the apical pad placed in the mid-axillary line on the patient's left chest. An acceptable alternative pad configuration is to use the same apical position but move the sternal pad to the right midaxillary line thereby creating a biaxillary position. Finally, the third acceptable alternative is to continue to use the apical position for one pad, but place the sternal pad in either the right or left upper back just below the scapula.

2010: G2010 acknowledges that the traditional sternal-apical position is a reasonable default position for AED pad placement. G2010 continues to recommend the biaxillary or apical infrascapular positions as acceptable alternatives. G2010 adds an additional pad configuration as acceptable: the anterior posterior position. Regardless of what pad placement

configuration used, rescuers should place the pads on the patient's bare chest or thorax.

Why Change? The pad placement configurations recommended by G2010 appear equally effective and there is no evidence to support the superiority of one position over another when using return of spontaneous circulation as an endpoint measure. However, for ease of training, the AHA will continue to use the traditional sternal-apical position.

Advanced cardiac life support

Simplified cardiac arrest algorithm

2005: In 2005, the American Heart Association's Guidelines first combined management principles of all cardiac arrest dysrhythmias into a single sequential algorithm.

2010: Guidelines 2010 continues to promote one algorithm for all cardiac arrest patients through an even more simplified approach. This streamlined approach is presented in two versions, a linear algorithm similar in form to previous versions and a new circular algorithm that clearly emphasizes the cyclical nature of action and reassessment.

Why Change? Previous cardiac arrest algorithms assumed that CPR was effective and therefore focused attention on advanced procedures. G2010 refocuses the rescuer on the principles of transforming conventional CPR into high-quality CPR. Both G2010 versions of the cardiac arrest algorithms build upon the foundation of high-quality CPR.

Passive ventilation

2005: G2005 did not address the issue of passive ventilation.

2005: Rescuers may provide passive ventilation as a reasonable alternative to positive pressure ventilation in the early stages of the out-of-hospital resuscitation effort (Class IIb).

Why Change? When the airway is not blocked, chest compression forces a small volume of stale air out of the patient's airway. The subsequent chest recoil creates a slight vacuum, which draws an equal volume of fresh air back into the lungs. Since even perfect CPR delivers a limited amount of blood to the lungs, this small volume of air may be enough to adequately oxygenate the available blood. In the early stages of the resuscitation effort, EMS providers may adopt a passive ventilation strategy whereby the team simply applies a high-flow oxygen mask to the patient's face and maintains the airway using simple adjuncts and head positioning. This allows the rescue team to focus more attention on providing effective chest compressions without the distraction of unnecessary assisted ventilation.

Advanced airway

2005: As a Class IIb recommendation, G2005 advised that when placement interferes with chest compressions, rescuers should delay advanced airway insertion until the patient achieves ROSC or fails to respond to initial resuscitation attempts. As Class IIa recommendations, the AHA says it is reasonable for properly trained rescuers to substitute ventilation through a supraglottic airway for ventilation with a bag-mask or ventilation through an endotracheal tube, while performing CPR.

2010: G2010 does not change the class rating related to advanced airways, but it continues to emphasize the importance of not interrupting chest compressions.

Why Change? As with any medical intervention, rescuers must carefully weigh the expected benefit of advanced airway insertion against the known risks the procedure poses. Despite the importance that rescuers have historically placed on endotracheal intubation during the management of cardiac arrest, there is little evidence demonstrating improvements in survival with the procedure even in systems with high first-time insertion success rates. In contrast, attempting to place an endotracheal tube often interrupts chest compressions, which experts acknowledge is a harmful complication. If the patient can be effectively ventilated with a bag-mask, it is therefore reasonable for rescuers to consider delaying endotracheal intubation attempts, especially if the attempt requires an interruption in chest compressions.

Alternatively, EMS agencies should consider adding supraglottic airways to the list of resuscitation equipment. Supraglottic airway design permits insertion without direct glottic visualization thus avoiding any interruption in chest compression. In direct comparisons, ventilation through a supraglottic airway is as effective as ventilation with a bag-mask device or through a properly placed endotracheal tube.

Waveform capnography

2005: G2005 lumped all $ETCO_2$ detection devices (quantitative and qualitative) into a Class IIa recommendation for verifying proper endotracheal tube position.

2010: G2010 makes several recommendations concerning waveform capnography. First, as a Class I recommendation, G2010 affirms that continuous waveform capnography, in addition to clinical assessment, is the most reliable method of confirming and monitoring correct placement of an endotracheal tube. When waveform capnography is not available, rescuers should use colorimetric or non-waveform $PETCO_2$ detectors, in addition to clinical assessment as the initial method for confirming correct endotracheal tube placement in a patient in cardiac arrest, a Class IIa recommendation. However, as a method of confirming proper placement of other advanced airways, capnography is neither recommended nor discouraged and therefore receives no recommendation. Finally, capnography provides a reasonable strategy to measure and optimize the effectiveness of chest compressions and to guide vasopressor therapy during cardiac arrest, a Class IIb recommendation.

Why change? For EMS systems that perform endotracheal intubation but lack continuous waveform

capnography, non-waveform end-tidal CO_2 detection devices provide a reasonable alternative. However, evidence suggests that colorimetric carbon dioxide detectors and non-waveform capnometers are no more accurate than auscultation and direct visualization for confirming tracheal tube position for patients suffering cardiac arrest.

Many EMS systems routinely use $ETCO_2$ detection devices with other advanced airways and often report good results. However, no formal investigation to date confirms the utility of this technology in determining correct placement of these non-tracheal advanced airways. As a result, G2010 can neither encourage nor discourage the use of capnography with non-tracheal advanced airways.

For the first time, the AHA guidelines make recommendations for the use of end-tidal carbon dioxide measurement for uses other than airway management. During CPR, $ETCO_2$ levels are highly dependent on blood flow to the lungs produced by chest compressions—higher quality chest compressions deliver more blood (and more carbon dioxide) to the lungs. Researchers have actually established a threshold value required for return of spontaneous circulation. Rescuers can now use the technology to optimize the effectiveness of chest compressions during the resuscitation effort. If the resuscitation team cannot achieve and sustain this threshold value, the patient will likely not survive.

CPR before defibrillation

2005: G2005 did not address the preshock pause in CPR except to note that rescuers should limit the interval from the moment the chest compressor delivers the last chest compression to the moment the defibrillator operator delivers the shock.

2010: G2010 makes a Class I recommendation for rescuers to perform CPR while the defibrillator is readied for use. As a Class IIb recommendation, G2010 advises that although acceptable, the benefit of delaying the first shock in order to provide a period of CPR is unclear for patients in cardiac arrest.

Why Change? Resuscitation teams should adopt and practice a strategy that reduces the time interval between the last chest compression and the delivery of a defibrillation attempt. This requires a coordinated effort between the defbrillator operator and the chest compressor. It is acceptable for the chest compressor to briefly pause compressions to verify the need for a defibrillation attempt. Once confirmed, the rescuer should immediately resume chest compressions while the defibrillator operator charges the machine. Even as the defibrillator operator signals patient clearance, the chest compressor should continue to provide compressions. When the defibrillator is completely charged, the defibrillator operator signals the chest compressor to clear then delivers the shock as soon as the chest compressor clears the chest. Shortening the time interval between the last chest compression and shock delivery by even a few seconds is associated with increased probability of shock success.

As a result of the defibrillation guidelines released in 2005, many agencies adopted a CPR-before-defibrillation strategy for patients found in cardiac arrest and an immediate-shock strategy for those who developed cardiac arrest in the presence of EMS. EMS treatment protocols may continue to reflect a different initial approach based on whether EMS witnesses the onset of the cardiac arrest period or not. However, the benefit of performing some period of chest compressions before delivering a defibrillation shock for victims of cardiac arrest found by EMS responders is unclear.

New medication recommendation: Atropine

2005: In 2005, atropine had a Class Indeterminate rating for asystole and pulseless electrical activity (PEA), meaning there was insufficient evidence to identify a benefit or harm.

2010: Atropine is unlikely to have a therapeutic benefit for patients suffering from PEA or asystole and is no longer recommended for routine use during cardiac arrest, making it a Class IIb recommendation.

Why Change: Although there is no evidence that atropine administration is harmful for victims of pulseless electrical activity or asystole, rescuers should stop giving atropine to cardiac arrest victims. Atropine still has a role in the management of the symptomatic bradycardia.

Chronotropic drug administration as an alternative to pacing

2005: Without assigning a specific class rating, G2005 recommended immediate transcutaneous pacing for patients suffering from symptomatic bradycardia unresponsive to atropine. As an alternative to transcutaneous pacing, G2005 made a Class IIb recommendation for dopamine or epinephrine

2010: The initial treatment for patients suffering from symptomatic bradycardia is atropine administration. This is a Class IIa recommendation and does not change from G2005. However, when symptomatic bradycardia is unresponsive to atropine, G2010 makes a Class IIa recommendation for rescuers to administer an IV infusion of dopamine or epinephrine or, alternatively, attempt transcutaneous pacing.

Why Change? Atropine administration remains the initial therapy for victims suffering from symptomatic bradycardia, defined as acutely altered mental status, ischemic chest discomfort, acute heart failure, hypotension or other signs of shock. Historically, EMS agencies moved to immediate transcutaneous pacing (TCP) for patients who did not improve following atropine administration. There are no studies that conclusively demonstrate improved outcome for patients who receive TCP compared to drug therapy. Therefore, it is reasonable for rescuers to select and deliver either therapy, depending on local resources.

New medication administration: Adenosine

2005: Without assigning a specific class rating, G2005 recommended adenosine administration to wide-complex tachycardia if rescuers believed it to be supraventricular in origin.

2010: Intravenous adenosine remains the recommended initial drug therapy for stable narrow-complex tachycardia, a Class I recommendation that did not change from G2005. G2010 now makes a Class IIb recommendation for rescuers to consider administering adenosine to any stable, regular, and undifferentiated wide-complex tachycardia. However, as a Class III recommendation, rescuers should not administer adenosine to patients with irregular wide-complex tachycardia.

Why Change? In most cases of stable tachycardia, rescuers should take the time to perform a 12-lead ECG to determine the identity of the tachyarrhythmia. This approach allows rescuers to tailor interventions to specific rhythms. When rhythm identification is not possible, rescuers should administer adenosine to stable patients experiencing narrow-complex tachycardia that fails to respond to vagal maneuvers. This remains unchanged from G2005.

However, rescuers can now administer adenosine to regular, wide-complex, undifferentiated tachycardia. If this unidentified rhythm is actually a supraventricular tachycardia (SVT) with aberrancy, the adenosine could either temporarily slow or convert the rhythm. If the rhythm is actually ventricular tachycardia, the adenosine will likely have no effect although it is wise to have a defibrillator present during drug administration.

Rescuers should not give adenosine to patients with an irregular wide-complex tachycardia, even if the patient appears stable. Adenosine administration in these cases could result in deterioration to ventricular fibrillation.

Cardioversion of atrial fibrillation

2005: G2005 recommended an initial monophasic energy dose of 100 to 200 joules for synchronized cardioversion of atrial fibrillation. If the machine uses a biphasic waveform, rescuers should use 100 to 120 joules.

2010: With unstable tachycardia patients experiencing atrial fibrillation, G2010 makes a Class IIa recommendation for rescuers to deliver an initial monophasic energy dose of 200 joules. For biphasic cardioversion, G2010 makes a Class IIa recommendation for an initial energy dose of 120 to 200 joules. In either case, rescuers should increase the energy level in a stepwise fashion if subsequent cardioversion attempts are necessary.

Why Change? If using a monophasic machine, rescuers may now select a 200-joule energy dose as the initial cardioversion setting for atrial fibrillation. Rescuers equipped with a biphasic machine may now select a slightly lower energy dose in the range of 120 to 200 joules. Recent evidence suggests that increasing the energy dose for cardioversion of atrial fibrillation from previous recommendations resulted in greater first shock success rate, particularly for patients with a higher body mass index.

All other recommendations for cardioversion remain the same as in G2005.

References

American Heart Association. *2005 American Heart Association Guidelines for CPR and ECC*. Dallas: American Heart Association; 2005.

American Heart Association. *2010 American Heart Association Guidelines for CPR and ECC*. Dallas: American Heart Association; 2010.